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ABSTRACT

This study examined the ecological and social impacts of rock climbing. The survey included climbing sites in 10 federal areas, 2 state parks, 1 private area, and 1 city park. Resource managers provided information on the observed impacts of rock climbing and current management practices to minimize impacts. Survey results indicate: (1) 71 percent of the respondents reported observable damage to soil as a result of climbers seeking access to climbing areas; (2) 57 percent of respondents expressed concern over vegetation damage caused by off-trail hiking and the mechanical removal of vegetation from rock surfaces; (3) 43 percent reported concerns related to conflicts between climbers and wildlife, particularly the disturbance of limited habitats; and (4) 78 percent of the respondents reported a variety of social impacts that detracted from the quality of the wilderness experience, including noise, the presence of climbers on the rockface, use of brightly colored clothing or rope, and the use of shiny hardware (such as bolts) that damages the rockface. Implementing nonrestrictive methods, such as educating visitors, is important for minimizing impact. The paper provides examples of direct-management practices to minimize climber-caused impacts and methods of dispersing information used by college and university programs. (LP)

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ED 370 722

An Investigation of the Ecological and Social Impacts Caused by Rock Climbers

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Abstract—This study examined the ecological and social impacts caused by rock climbers. In addition, current management practices undertaken by resource managers to help reduce such impacts were also identified. It was also the intent of this study to collect and synthesize information to assist in the development of an audio-visual program to foster a minimal impact climbing ethic. Resource managers were asked to provide information on the observable ecological and social impacts created by individuals participating in the sport of rock climbing. Information received from resource managers revealed observable impacts to the vertical environment as well as impacts to soil, vegetation, wildlife, and other recreationists.

Introduction

People continue to venture into our nation's wildlands in search of outdoor recreation opportunities. Much of this interest in wildland recreation can be attributed to a variety of social and economic factors including: developments and increased availability of new and safer equipment (Bishof, 1985), popularity of college and university outdoor programs (Morford, 1990), instructional texts and videos (Long, 1990; Robinson, 1987), a proliferation of commercial guide and instructional programs (Chase, 1990), media coverage on television (Danger, 1990),and people seeking healthier lifestyles (Kennedy, in Lebow, 1989).

Researchers have projected that growth will occur in outdoor recreational activities that contain elements of risk and adventure (Cordell & Siehl, 1989). For example, participation in the activities of hiking and mountaineering tripled from 1966-1979 (Hammitt & Cole, 1987). A similar activity, rock climbing experienced an 8% growth in participation from 1980 to 1984 and a 12% increase between 1985 and 1989 (Gooding in Moser, 1990). It has been estimated

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that there are from 150,000 to 500,000 active rock climbers in the United States today (Webster, 1990; Gooding in Moser, 1990).

As a result of the growth and interest in the sport of rock climbing, ecological as well as social impacts have emerged that are beginning to compromise the sport with many of the nation's popular climbing areas exhibiting the effects of overuse. According to Lucas (1979) an impact is an undesirable change in environmental conditions. Impacts can compromise the objectives of preserving the naturalness of an area, thus making recreational areas and facilities less attractive, appealing or functional to the visitor (Cole, 1986).

The ecological and social impacts created from increased climbing activity, and years of non-regulation is causing concern among resource managers as well as climbers. Of major concern is the ability to integrate the growth of climbing with the requirements of preserving and administering public and in some cases private lands. Currently, climbing area policies are being developed throughout the United States. It's a matter of time before they are implemented. Factors contributing to this problem include the development of artificial climbing walls which bring climbing to the masses (Attarian, 1990) and the introduction of European climbing styles and ethics (sport climbing) which according to Metcalf (1991) "is safer, less committing, easier to learn, more loquacious, and more approachable than traditional climbing" (pg. 8).

Methodology

Well known private, state, federal and locally managed areas where rock climbing is a recognized recreational activity were contacted and asked to identify the ecological and social impacts associated with the activity and gather information on current management practices and policies to control impacts. Climbing areas included in the survey were identified after reviewing the Access column in Climbing from 1985-1991. This column appears in each issue and serves as an information exchange to keep readers informed of any access problems to climbing areas, local management practices and issues, and significant resource problems or concerns. From this review ten federal areas, two state parks, one private area, and one city park were identified as climbing areas with impact problems. To gather relevant data, a letter was sent to each area resource manager requesting information on the impacts observed, current management practices undertaken to minimize impacts, and any other information helpful to the study. Information received from the managers included brochures, statements identifying the major impacts, regulations specific to the activity, and resource management plans. A variety of ecological and social impacts were reported from the fourteen climbing areas surveyed. Impacts to soil and vegetation both on and off the rock, improper disposal of human waste, and disturbance to wildlife were reported as common occurrences. Visual impacts to the rock and its environs, bolting practices, and potential damage to historical and cultural sites were also identified as concerns. Table 1 (see next page) lists the areas responding and the impacts reported. It should be mentioned that the impacts reported by resource managers were based on their observations and not on empirical evidence.

Results: Impacts to Soil

Of the areas contacted 71% reported some observable damage to soil as a result of climbers seeking access to climbing areas. Damage to soil can limit aeration, affect temperature, moisture content, nutrition, and soil micro-organisms (Hammit & Cole, 1987). Erosion, the most damaging impact to soil, occurs primarily through the development and use of trails.

Table 1. Reported impacts at 14 selected United States rock climbing areas

Location	Impacts					
	a Soil	Vegetation	b Wildlife	c Visual	d Rock	e Other
CNP	X			X	X	X
CCNMP	X	X				
CRNR					X	X
CNM	X	X		X	X	X
DTNM	X		X	X	X	
EDCSP	X	X	X	X	X	X
GG				X	X	
HTSP			X	X		
JTNM			X	X	X	
NRGNR	X	X	X			
PNM	X	X	X	X	X	X
RMNP	X	X	X	X	X	X
SGUNKS	X	X		X		X
YNP	X	X	X	X	X	X

a. Impacts to soil include trail erosion, improper trail routing and development.
b Wildlife: primarily disruption of nesting raptors.
c. Visual impacts may include one or more of the following: use of white chalk, bolts, colored slings, litter.
d. Impacts to the rock may include one or more of the following: bolting practices, chipping holds.
e. Other impacts may include one or more of the following: damage to cultural/historical sites, improper disposal of human waste, concern for the safety of other recreationists, noise.

CNP=Canyonlands National Park, CCNMP=Chickamauga and Chattanooga National Military Park, CRNR=City of Rocks National Reserve, CNM=Colorado National Monument, EDCSP=Eldorado Canyon State Park, DTNM=Devil's Tower National Monument, GG=Garden of the Gods, GTNP= Grand Teton National Park, HTSP= Hueco Tanks State Park, JTNM=Joshua Tree National Monument, NRGNR=New River Gorge National River, PNM=Pinnacles National Monument, RMNP=Rocky Mountain National Park, SGUNKS=Shawangunks, YNP=Yosemite National Park.

Problems may be more serious at higher elevations where the soil is thinner and rainfall greater (Bratton, et al., 1982).

DeBenedetti (1990) reported that climbers may contribute to erosion by establishing access trails to the rockface, trail development upon the staging area, and the formation of descent trails. In most cases climbing routes are accessed by ascending steep terrain to the cliff base. Trails for access are usually ill-defined causing climbers to unknowingly take several paths to the same destination. For example, twenty two climbing sites in Pinnacles National Monument were reported to have access trails leading to them (DeBenedetti , 1990). In a short period of

time, steep, secondary trails appear which begin to divert water, causing soil loss, trenching and vegetation loss (Rocky Mountain National Park [RMNP], 1990). Trail erosion can also occur when switchback trails, designed as an efficient way to travel over steep terrain are shortcutted. In some instances climbers have consciously engineered their own trails to cliff base without official consent or knowledge (D. Riskind, personal communication,1991).

Impacts to soil on the rock may be initiated during the development of a new climb. This occurs when climbers resort to "gardening" techniques which requires the manual removal of soil and other debris from cracks on the climbing route in order to place protection and provide handholds. In some cases, soil may be mechanically removed from the rockface by using a wire brush or toothbrush to scour away soil and vegetation. Another practice, trundling, or the removal of loose, unstable rock and other debris from a climb by creating human-made rockfall may also enhance the removal of soil. Other climbing practices are also undertaken which damage the rockface, leaving it unnatural in appearance. For example, the placement of bolts and pitons, a highly destructive practice, enlarges cracks and places unnatural objects in the rockface. In some areas, climbers have resorted to chiseling into the rock to create handholds.

Water quality may also be affected through the secondary effects of soil erosion and human/animal waste (Hammitt & Cole, 1987). Fecal matter is present at the base of cliffs, discarded on belay/bivouac ledges, or thrown off the cliff face. The Shawangunks, RMNP, and Yosemite National Park (YNP) reported the improper disposal of human waste as a major concern.

Results: Impacts to Vegetation

Of all the changes that occur as a result of recreational use, impacts to vegetation are the most visible (Hammit & Cole, 1987). Damage to vegetation occurs during the initial development and use of a recreational site, for example during the development of a new rock climbing area (Hammitt & Cole, 1987). Fifty seven percent of the resource managers responding indicated a concern over vegetation damage. Managers noted that climbers cause impacts to vegetation primarily through off trail hiking, and mechanically removing vegetation from the rock surface when establishing new climbing routes. Trees may also be damaged due to the effects of trampling, and the consistent use of trees for rappel/belay anchors.

Results: Impacts to Wildlife

Concerns over climber/wildlife conflicts were reported by 43% of the areas responding. Past research has indicated that human-wildlife encounters may have a negative effect on population densities, feeding and migration patterns, and diversity of wildlife. Impacts to wildlife can also induce physiological and psychological stress, and alter reproduction (Fain, et al., 1977; Atchinson, 1975; Ream, 1979). However, the greatest potential for impacts to wildlife usually occurs when a particular species has a limited habitat, especially a habitat that attracts recreationists due to a particular feature (Hendee, 1978). This may be true of rock climbing. Climbers are attracted to remote rock faces to pursue their sport. In some instances these rock faces are ideal nest sites for raptors, especially peregrine falcons, prairie falcons, and golden eagles. According to DeBenedetti (1990) three factors may affect behavior among cliff nesting birds including: 1) human activity in close proximity to nest sites; 2) activity of significant duration; and 3) human presence above the nest site. Nest sites were reported in Devils Tower National Monument, WY, Joshua Tree National Monument, CA; New River Gorge, WVA, Pinnacles National Monument, CA, Rocky Mountain National Park, CO and Yosemite

National Park, CA.

Results: Social Impacts

Along with ecological impacts, a growing number of climbing related social impacts were reported. According to Hendee, et al. (1978) social impacts are those behaviors that "can detract from the quality of the wilderness experience of others" (pg. 117). Over three fourths (78%) of the managers contacted reported a variety of social impacts. Examples of social impacts include: noise and the presence of climbers on the rockface. The use of brightly colored software (clothing, webbing, rope) that contrasts with the rockface, shiny hardware (bolts, pitons, carabiners), the use of white chalk, and the presence of climbers on the rockface, especially in scenic areas are visual impacts that may detract from the experience of other visitors (RMNP, 1990). The ecological impacts of trail and rock erosion and vegetation damage may detract from the aesthetic quality of a recreation experience as well (Hammitt & Cole, 1987). In addition, RMNP and YNP reported litter deposited by climbers as a major concern. Climber generated litter usually appears in the form of cigarette butts, athletic tape, and food and water containers usually left at the base of a climb or on the climb itself. Spectators may also contribute to this problem by leaving litter behind at sites from which they view climbers (YNP, 1990).

Of the impacts mentioned, bolting practices have received the greatest amount of attention. Bolting is a practice undertaken by climbers to secure a permanent anchor to the rock. The placement of permanent anchors provides for a safer climbing experience since other means for safegarding the climb may not be possible using other techniques. While this may be true, bolting is also a human-caused alteration of the rock.

In order to place a bolt into the rock, a hole is drilled either by hand, or most recently by portable, battery powered drills. The use of portable electric drills is prohibited in wilderness areas and in some popular climbing areas. Rocky Mountain National Park, Joshua Tree National Monument, and Pinnacles National Monument have banned the use of power drills.

Noise created by climbers may detract from the experience of other recreationists, and may also disturb wildlife. Forty seven percent of the respondents identified noise as concern. Tape players and radios popular with some climbers contribute to noise levels, as well as the noise generated from portable power drills or rock hammers used to place bolts as dictated by current climbing practices.

Management Practices to Minimize Impacts

Management initiatives and cooperation among climbers are needed to reduce human impact in order to conserve the uniqueness of the vertical environment in question, and to preserve it for future generations of climbers. In the past a number of agency controls have been enacted to protect our natural resources. However, federal legislation, permits, lottery systems, restricted areas, licensing and limited access have taken most of the responsibility away from the visitor and have given it to a government agency (McAvoy & Dustin, 1981). Forcing restrictive measures on visitors detracts from user satisfaction. For this reason, less restrictive measures of reducing visitor impacts are desirable.

One effective management method has been to educate the visitor on proper use and conduct within a particular environment. If climbers are more aware of their behavior while participating in climbing and related activities, less impact could possibly result. Recreation managers are increasingly interested in the use of information and education as a management

tool because of its potential ability to increase the quality of the recreation experience, reduce social conflict, gain support for management practices, and reduce management costs during times of budgetary constraints and personnel changes (Roggenbuck & Ham. 1986). Education is a desirable management technique because it is non-authoritarian and serves the recreationist's desires rather than being restrictive and regulating. Education stresses modification of behavior while maintaining individual choice (Robertson,1982). For educational methods to be of value to managers, methods must be practical, inexpensive, and easily administered (Roggenbuck & Ham. 1986). Most importantly, education and information can reduce resource impacts, since it has been suggested that most impact behaviors are caused through ignorance and unskilled actions (Hendee, Stankey & Lucas, 1977; Hart, 1980). A variety of management efforts have been initiated to minimize the impacts on climbing areas. Table 2 lists the practices that have been undertaken by managers to address climber related impacts.

Table 2. Summary of management practices undertaken to minimize climber caused impacts.

Impact	Management Practice
Soil/Vegetation	encourage use of resistant surfaces to access/descend climbs
	closures to protect resources and prevent further damage
	construct platforms beneath popular climbs
	trail hardening/paving
	use of education and signage
	designate access trails
Fixed Protection (Bolting)	enforce current regulations
	self-regulation among climbers
	zoning (limit the placement of bolts to specified areas)
	no bolting
	peer-review process re:new route development
	prohibit the use of colored bolt hangers
	paint bolts to match rock color
	Limits of Acceptable Change defined for defacement of rock
	ban the use of portable electric drills
Chalk use	prohibit use
	prohibit use in high-impact areas
	encourage the use of earth tone colors
	continue use with education
	volunteer clean-ups of rock surface
Wildlife	seasonal closure of areas during nesting and other critical wildlife habitats
Visual Impacts	encourage the use of natural colored webbing for belay/rappel anchors
	install chain for permanent belay/rappel anchors
	prohibit the use of colored bolt hangers
	paint bolts to match rock color
	no climbing within 50' of cultural/historical resources

Table 2 Continued

Waste Disposal	educate in the proper disposal of human waste construct latrines or other waste disposal units at popular sites provide containers (bags) for waste disposal
Other	informational brochures describing minimal impact climbing practices and local regulations encourage climber/manager/agency liaisons; cooperative efforts develop climber education programs develop interpretive materials/programs

Some of the most common approaches of education and information dispersal include the distribution of brochures to climbers. For example, Joshua Tree National Monument, New River Gorge National River, Rocky Mountain National Park and Yosemite National Park are distributing brochures to climbers which contain a climber's code of ethics, local regulations, and an emphasis on minimal impact climbing practices. Information to educate climbers can also be achieved through the use of trailhead bulletin boards, ranger contacts, and interpretive programs. Other methods to disperse information can be initiated through outfitter and guide services, retailers and industry involvement, and through climber to climber contacts, College and university outdoor programs can also be an important outlet for encouraging a minimal impact climbing ethic. Table 3 identifies methods for information dispersal by college/ university programs.

Table 3. Methods of information dispersal by college/university outdoor programs.

- Develop bulletin board displays to convey information.
- Include minimal impact climbing ethic as a topic in instructional programs.
- Develop intrepretive slide program showing impacts and ways to minimize them.
- Get involved with local climbing area to perform service activitie (trail maintenance, chalk clean-up, etc.).
- Raise funds to help maintain local climbing area(s).
- Encourage program instructors/guides to act as positive role models.
- Develop educational materials in conjunction with local management agencies that promote a minimal impact climbing ethic.
- Initiate partnerships with local retailers to disperse information through in-shop programs and other methods.

Conclusion

Results of this study indicated that a variety of impacts were common to most areas. However, management practices to control impacts varied, with indirect management techniques being the most successful. This was especially true when climbers were included in the decision making process. Of all the management practices listed, education and informational dispersal was the most common and seemed to be the most effective. It is recommended that other indirect management techniques be initiated to help reduce climber related impacts.

Lacking, was any empirical evidence to support the observations of the impacts described by managers. Are climbers solely responsible for the impacts that occur around climbing sites, or are other recreationists contributing to the problem as well? What affect if any do climbers have on wildlife? What other factors contribute to the impacts observed ? Answers to these questions and others can contribute to a better understanding of the impacts climbers have on the environment, and hopefully lead to management practices acceptable to both climbers and resource managers.

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